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Dynamics of rigid and flexible extended bodies in viscous films and membranes ALEX J. LEVINE, Dept. of Physics, University of Massachusetts, Amherst, T.B. LIVERPOOL, Applied Mathematics, University of Leeds, FRED C. MACKINTOSH, Division of Physics & Astronomy, Vrije Universiteit — The mobility of inclusions (e.g. proteins or lipid "rafts") in membranes is a fundamental physical parameter controlling a number of cellular processes. In this talk, we examine the motion of rod-like inclusions in continuum viscous films and membranes as a representative example of the general problem of determining the mobility of arbitrarily shaped, extended bodies moving in membranes or at liquid/liquid interfaces. We demonstrate an important difference between rod mobilities in films/membranes and in bulk fluids, which is present even when the dissipation is dominated by the fluid stress: For large inclusions we find that rotation and motion perpendicular to the rod axis exhibit purely local drag, in which the drag coefficient is algebraic in the rod dimensions. We also study the dynamics of the undulation modes of a semiflexible filament embedded in the membrane and find two dynamical regimes in the relaxation spectrum.

Alex Levine
University of Massachusetts, Amherst

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